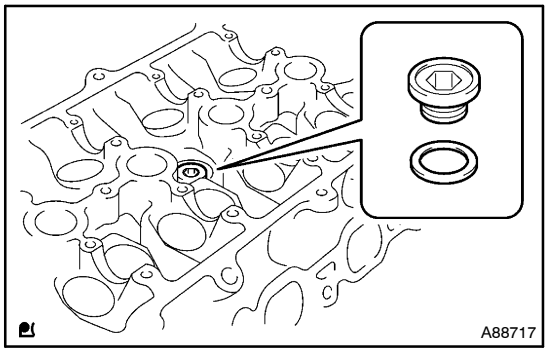
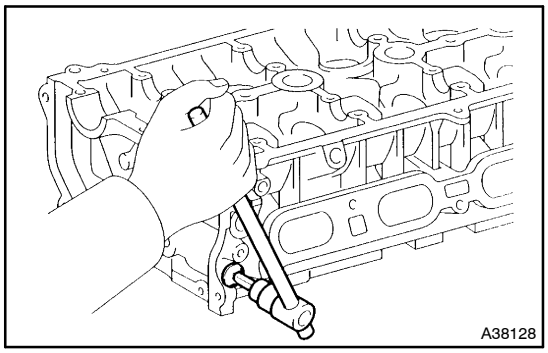
141NY–01

OVERHAUL



1. REMOVE W/HEAD TAPER SCREW PLUG NO.1

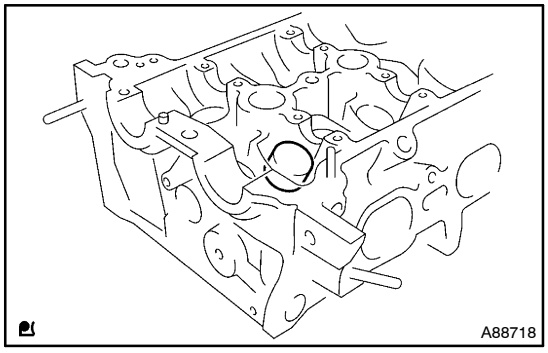
(a) Using a 10 mm socket hexagon wrench, remove the taper screw plug with head No. 1 and gasket.



2. REMOVE OIL CONTROL VALVE FILTER

(a) Using an 8 mm hexagon wrench, remove the taper screw plug with head No. 2.

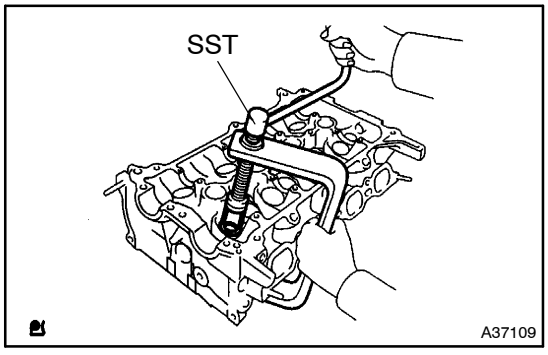
(b) Remove the oil control valve filter and gasket.



3. REMOVE VALVE LIFTER

HINT:

Keep the removed parts in the correct order so that they can be returned to the original locations when reassembling.



4. REMOVE INTAKE VALVE

(a) Using SST, remove the retainer lock.

SST 09202–70020 (09202–00010, 09202–01010, 09202–01020)

(b) Remove the retainer, compression spring and valve.

HINT:

Keep the removed parts in the correct order so that they can be returned to the original locations when reassembling.

5. REMOVE EXHAUST VALVE

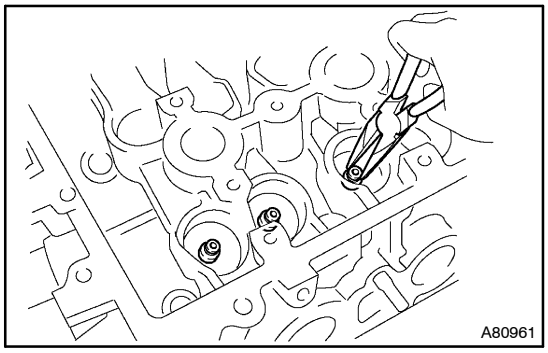
(a) Using SST, remove the retainer lock.

SST 09202–70020 (09202–00010, 09202–01010, 09202–01020)

(b) Remove the retainer, compression spring and valve.

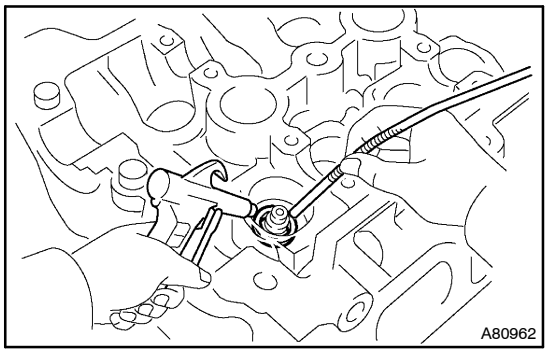
HINT:

Keep the removed parts in the correct order so that they can be returned to the original locations when reassembling



6. REMOVE VALVE STEM OIL O SEAL OR RING

(a) Using needle–nose pliers, remove the oil seal.



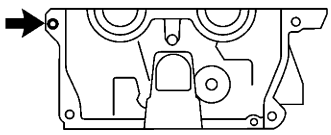
7. REMOVE VALVE SPRING SEAT

(a) Using a magnetic finger and compression air, remove the valve spring seat.

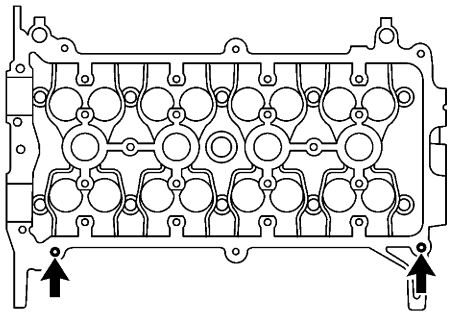
8. REMOVE STUD BOLT

(a) Remove the 7 stud bolts indicated in the illustration.

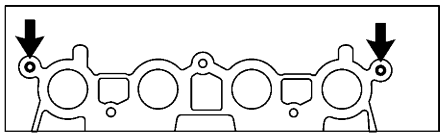
Front side:



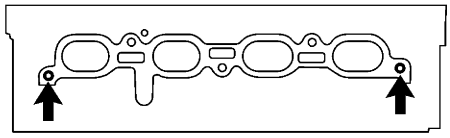
Upper side:



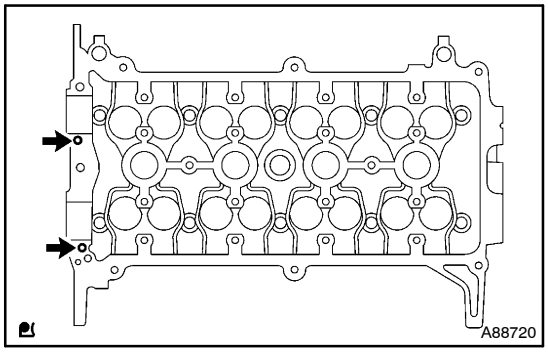
Exhaust manifold side:



Intake manifold side:

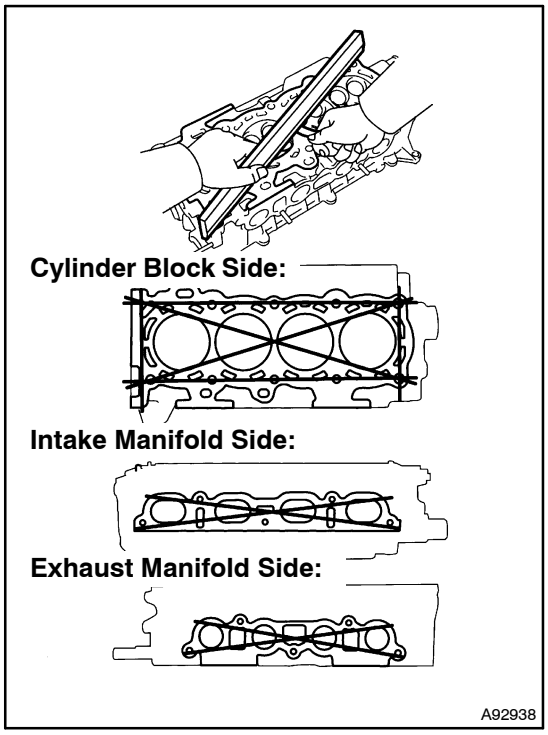


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9. REMOVE CAMSHAFT BEARING CAP SETTING RING PIN

(a) Remove the 2 ring pins indicated in the illustration.

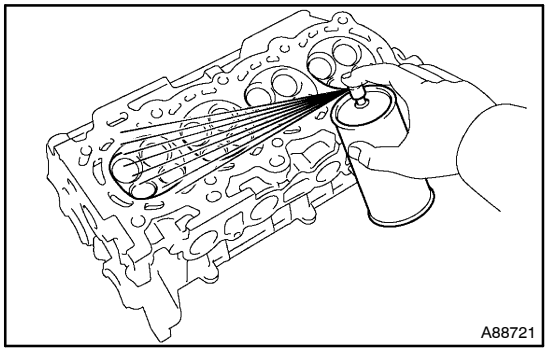


10. INSPECT CYLINDER HEAD FOR FLATNESS

(a) Using a precision straight edge and feeler gauge, measure the warpage on the cylinder block side and the intake and exhaust manifold sides.

Maximum warpage:
0.05 mm (0.0020 in.) for cylinder block side
0.10 mm (0.0039 in.) for intake manifold side
0.10 mm (0.0039 in.) for exhaust manifold side

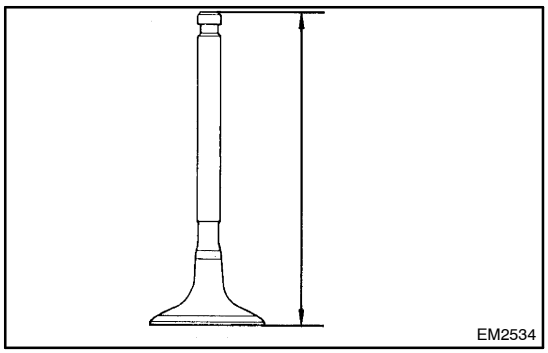
If the warpage is greater than maximum, replace the cylinder head.



11. INSPECT CYLINDER HEAD FOR CRACKS

(a) Using a dye penetrate, check the combustion chambers, intake ports, exhaust ports and contact surface of the cylinder block for cracks.

If cracked, replace the cylinder head.

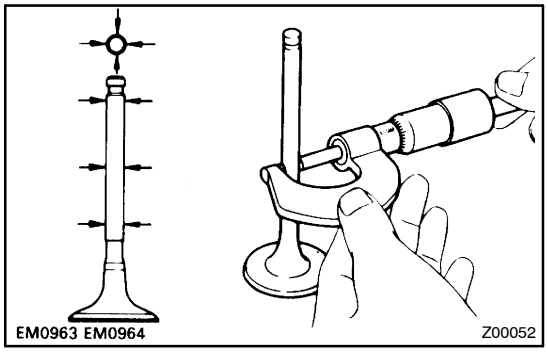


12. INSPECT INTAKE VALVE

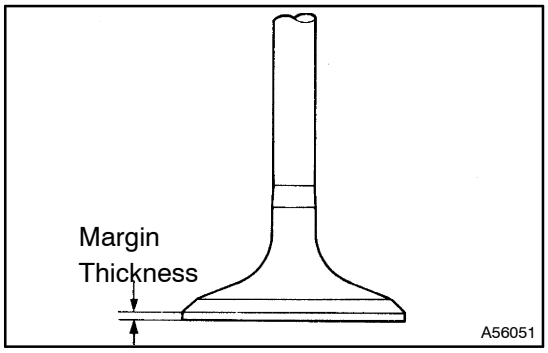
(a) Using vernier calipers, measure the overall length of the intake valve.

Standard overall length: 89.25 mm (3.5138 in.)
Minimum overall length: 88.95 mm (3.5020 in.)

If the overall length is less than minimum, replace the valve.



(b) Using a micrometer, measure the diameter of the valve stem.
Valve stem diameter:
4.970 to 4.985 mm (0.1957 to 0.1963 in.)



(c) Using vernier calipers, measure the thickness of the valve head margin.
Standard margin thickness: 1.0 mm (0.039 in.)
Minimum margin thickness: 0.7 mm (0.028 in.)

If the margin thickness is less than minimum, replace the valve.

13. INSPECT EXHAUST VALVE

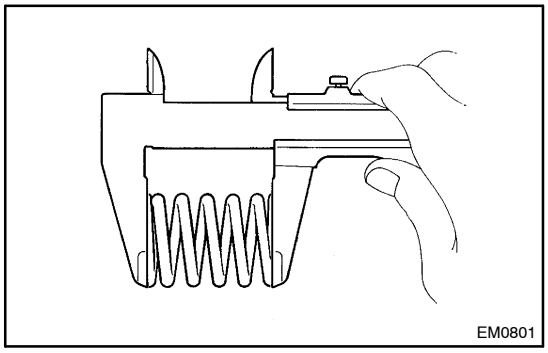
(a) Using vernier calipers, measure the overall length of the exhaust valve.
Standard overall length: 87.90 (3.4606 in.)
Minimum overall length: 87.60 (3.4488 in.)

If the overall length is less than minimum, replace the valve.

(b) Using a micrometer, measure the diameter of the valve stem.
Valve stem diameter: 4.965 to 4.980 mm (0.1955 to 0.1961 in)

(c) Using vernier calipers, measure the thickness of the valve head margin.
Standard margin thickness: 1.15 mm (0.0453 in.)
Minimum margin thickness: 0.85 mm (0.0335 in.)

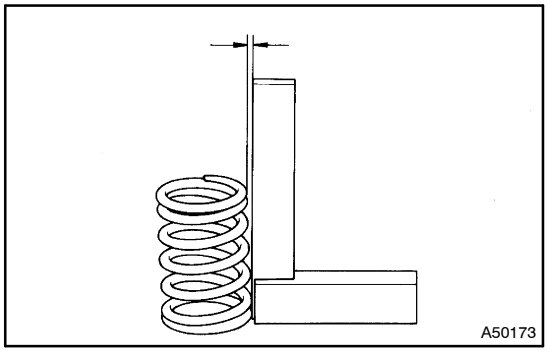
If the margin thickness is less than minimum, replace the valve.



14. INSPECT OUTER COMPRESSION SPRING

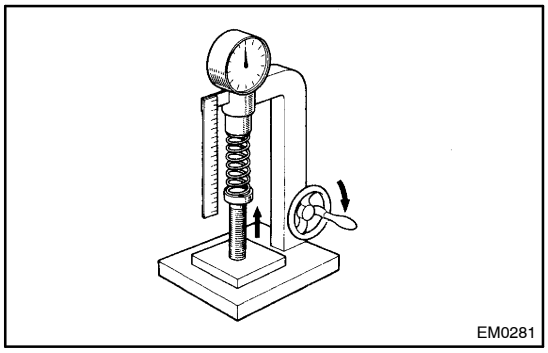
(a) Using vernier calipers, measure the free length of the valve spring.
Free length: 59.77 mm (2.3531 in.)

If the free length is not as specified, replace the valve spring.



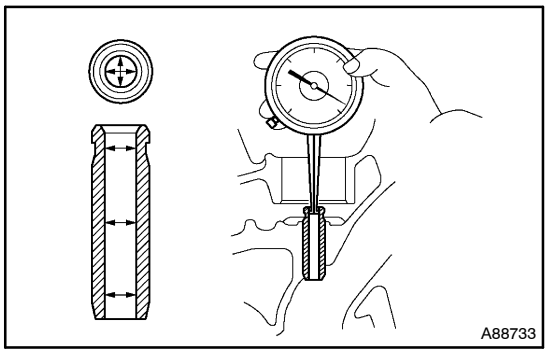
(b) Using a steel square, measure the deviation of the valve spring.
Maximum deviation: 1.6 mm (0.063 in.)
Maximum angle: 2°

If the deviation is not as specified, replace the valve spring.



(c) Using a spring tester, measure the tension of the spring when the spring is the specified installed length.
Installed tension:
140 to 154 N (14.2 to 15.7 kgf, 31.5 to 34.6 lbf) at 32.5 mm (1.280 in.)
Maximum working tension:
180 to 198 N (18.4 to 20.2 kgf, 40.5 to 44.5 lbf) at 25.1 mm (0.988 in.)

If the tension is not as specified, replace the valve spring.

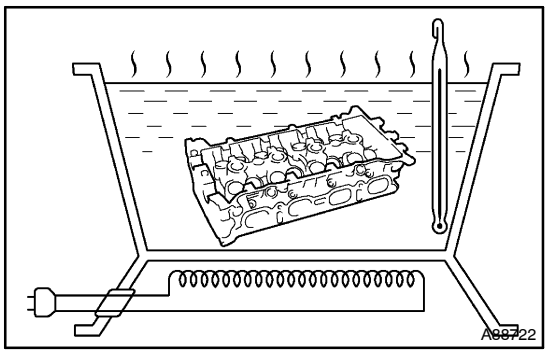


15. INSPECT VALVE GUIDE BUSHING OIL CLEARANCE

(a) Using a caliper gauge, measure the internal diameter of the valve guide bushing.
Bushing inside diameter:
5.010 to 5.030 mm (0.1972 to 0.1980 in.)

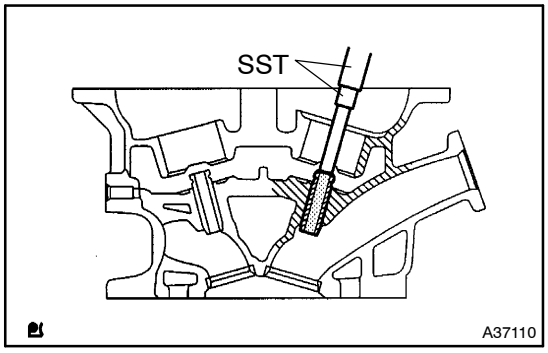
(b) Subtract the valve stem diameter measurement from the internal diameter measurement of the valve guide bushing.
Standard oil clearance:
0.025 to 0.060 mm (0.0010 to 0.0024 in.) for intake side
0.030 to 0.065 mm (0.0012 to 0.0026 in.) for exhaust side
Maximum oil clearance:
0.08 mm (0.0031 in.) for intake side
0.10 mm (0.0039 in.) for exhaust side

If the clearance is greater than maximum, replace the valve and valve guide bush.



16. REMOVE INTAKE VALVE GUIDE BUSHING

(a) Heat the cylinder head up to 80 to 100°C

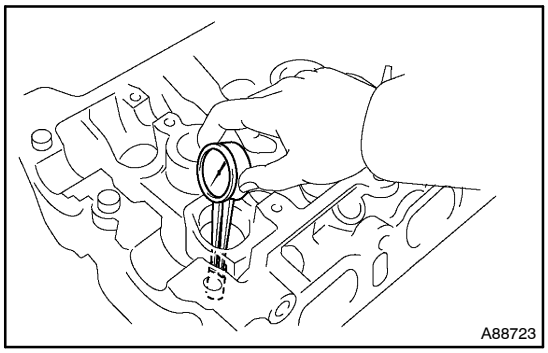


(b) Using SST and a hammer, tap out the valve guide bushing to the combustion chamber side.
SST 09201–10000 (09201–01050), 09950–70010 (09951–07100)

17. REMOVE EXHAUST VALVE GUIDE BUSHINGS

(a) Heat the cylinder head up to 80 to 100°C

(b) Using SST and a hammer, tap out the valve guide bushing to the combustion chamber side.
SST 09201–10000 (09201–01050), 09950–70010 (09951–07100)



18. INSTALL INTAKE VALVE GUIDE BUSHING

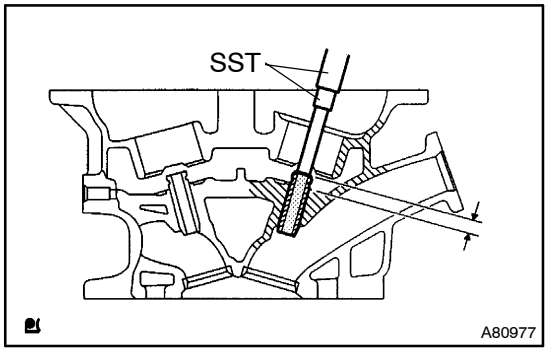
(a) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.
Diameter: 9.685 to 9.706 mm (0.3813 to 0.3821 in.)

HINT:

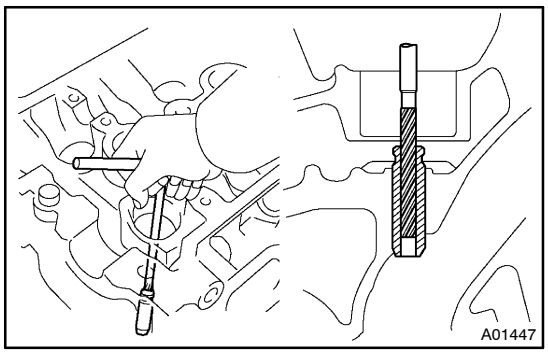
- If the bushing bore diameter is as specified, install the standard bushing.
- If the bushing bore diameter is not as specified, correct it to 9.735 to 9.755 mm (0.3833 to 0.3841 in.) and install the oversize bushing.

Bushing size	Bushing bore diameter mm (in.)
Standard	9.685 to 9.706 (0.3813 to 0.3821)
Over size	9.735 to 9.755 (0.3833 to 0.3841)

(b) Heat the cylinder head up to 80 to 100°C.



(c) Using SST and a hammer, tap in a new valve guide bushing to the specified protrusion height.
SST 09201–10000 (09201–01050), 09950–70010 (09951–07100)
Protrusion height: 9.0 to 9.4 mm (0.354 to 0.370 in.)



(d) Using a reamer, ream inside the valve guide bushing to obtain the specified oil clearance between the valve guide bushing and valve stem.
Standard oil clearance:
0.025 to 0.060 mm (0.0010 to 0.0024 in.)

19. INSTALL EXHAUST VALVE GUIDE BUSHINGS

(a) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.
Diameter: 9.685 to 9.706 mm (0.3813 to 0.3821 in.)

HINT:

- If the bushing bore diameter is as specified, install the standard bushing.
- If the bushing bore diameter is not as specified, correct it to 9.735 to 9.755 mm and install the oversize bushing.

Bushing size	Bushing bore diameter mm (in.)
Standard	9.685 to 9.706 (0.3813 to 0.3821)
Over size	9.735 to 9.755 (0.3833 to 0.3841)

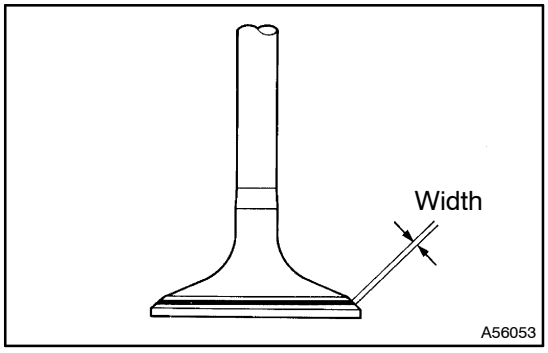
(b) Heat the cylinder head up to 80 to 100°C.

(c) Using SST and a hammer, tap in a new valve guide bushing to the specified protrusion height.
SST 09201–10000 (09201–01050), 09950–70010 (09951–07100)
Protrusion height: 9.0 to 9.4 mm (0.354 to 0.370 in.)

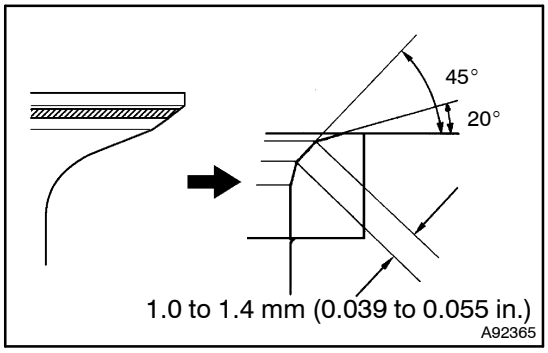
(d) Using a reamer, ream inside the valve guide bushing to obtain the specified oil clearance between the valve guide bushing and valve stem.
Standard oil clearance: 0.030 to 0.065 mm (0.0012 to 0.0026 in.)

20. INSPECT VALVE SEATS

(a) Apply a light coat of prussian blue (or white lead) to the valve face.



(b) Check the valve face and valve seat by the following procedures.
(1) If blue appears 360°C around the valve face, the valve is concentric. If not, replace the valve.
(2) If blue appears 360°C around the valve seat, the guide and valve face are concentric. If not, resurface the valve seat.
(3) Check that the valve seat contact is in the middle of the valve face with the width between 1.0 and 1.4 mm (0.039 to 0.055 in.)

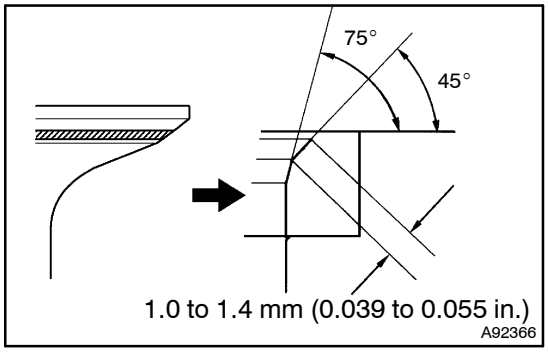


21. REPAIR INTAKE VALVE SEAT

NOTICE:

Gradually releasing the seat cutter pressure makes smooth valve seat surface.

(a) If the valve seating is too high on the valve face, use the 20° and 45° cutters to correct the valve seat.



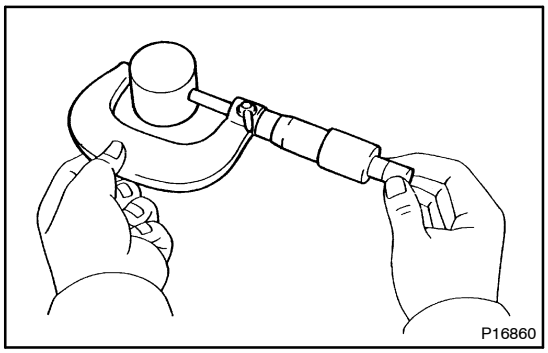
(b) If the valve seating is too low on the valve face, use the 45° and 75° cutters to correct the valve seat.
(c) Lap the valve and valve seat with an abrasive compound.
(d) Recheck the valve seating surface.

22. REPAIR EXHAUST VALVE SEAT

NOTICE:

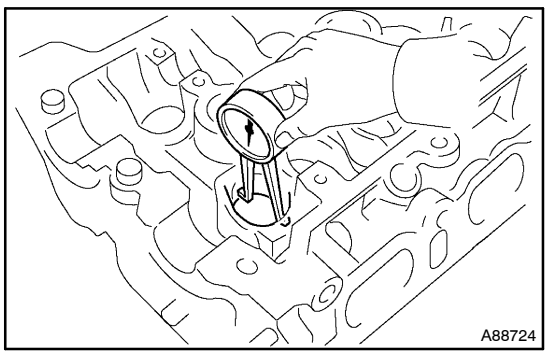
Gradually releasing the seat cuter pressure makes smooth valve seat surface.

(a) If the valve seating is too high on the valve face, use the 20° and 45° cutters to correct the valve seat.
(b) If the valve seating is too low on the valve face, use the 45° and 75° cutters to correct the valve seat.
(c) Lap the valve and valve seat with an abrasive compound.
(d) Recheck the valve seating surface.



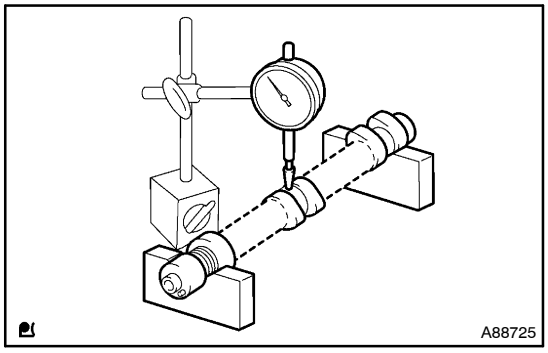
23. INSPECT VALVE LIFTER

(a) Using a micrometer, measure the lifter diameter.
Lifter diameter:
30.966 to 30.976 mm (1.2191 to 1.2195 in.)



24. INSPECT VALVE LIFTER OIL CLEARANCE

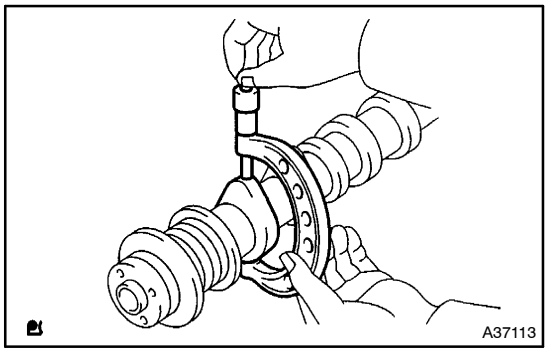
(a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.
Lifter bore diameter:
31.009 to 31.025 mm (1.2208 to 1.2215 in.)
(b) Subtract the lifter diameter measurement from the lifter bore diameter measurement to obtain the oil clearance.
Standard oil clearance:
0.033 to 0.059 mm (0.0013 to 0.0023 in.)
Maximum oil clearance: 0.100 mm (0.0039 in.)
- If the clearance is greater than maximum, replace the valve lifter.
- If necessary, replace the cylinder head.



25. INSPECT CAMSHAFT

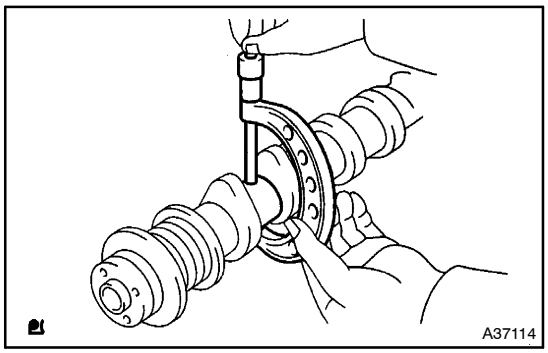
(a) Inspect the circle runout.
  (1) Place the camshaft on V–blocks.
  (2) Using a dial indicator, measure the circle runout of the camshaft at the center journal.
  Maximum circle runout: 0.03 mm (0.0012 in.)

If the circle runout is greater than maximum, replace the camshaft.



(b) Inspect the height of the cam lobes.
  (1) Using a micrometer, measure the cam lobe height.
  Standard cam lobe height:
  42.310 to 42.410 mm (1.6657 to 1.6697 in.)
  Minimum cam lobe height: 42.16 mm (1.6598 in.)

If the cam lobe height is less than minimum, replace the camshaft.



(c) Inspect the diameter of the cam journals.
  (1) Using a micrometer, measure the cam journal diameter.
  No. 1 journal diameter:
  34.449 to 34.465 mm (1.3563 to 1.3569 in.)
  Other journals diameter:
  22.949 to 22.965 mm (0.9035 to 0.9041 in.)

If the cam journal diameter is not as specified, inspect the oil clearance.

26. INSPECT NO.2 CAMSHAFT

(a) Inspect the circle runout.
  (1) Place the camshaft on V–blocks.
  (2) Using a dial indicator, measure the circle runout of the camshaft at the center journal.
  Maximum circle runout: 0.03 mm (0.0012 in.)

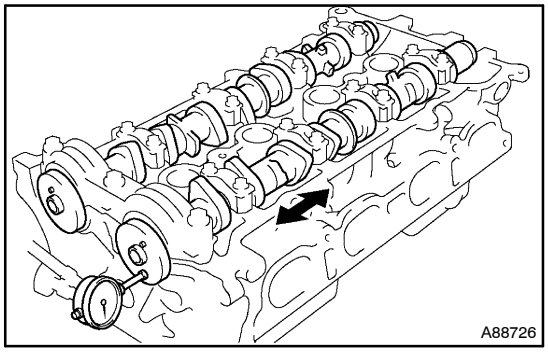
If the circle runout is greater than maximum, replace the camshaft.

(b) Inspect the height of the cam lobes.
  (1) Using a micrometer, measure the cam lobe height.
  Standard cam lobe height: 44.046 to 44.146 mm (1.7341 to 1.7380 in.)
  Minimum cam lobe height: 43.90 mm (1.7283 in.)

If the cam lobe height is less than minimum, replace the camshaft.

(c) Inspect the diameter of the cam journals.
  (1) Using a micrometer, measure the cam journal diameter.
  No. 1 journal diameter: 34.449 to 34.465 mm (1.3563 to 1.3569 in.)
  Other journals diameter: 22.949 to 22.965 mm (0.9035 to 0.9041 in.)

If the cam journal diameter is not as specified, inspect the oil clearance.



27. INSPECT CAMSHAFT THRUST CLEARANCE

(a) Set the camshaft to the cylinder head, then install the camshaft bearing cap (see page 14–98).

(b) Using a dial indicator, measure the thrust clearance of the camshaft while moving the camshaft back and forth.

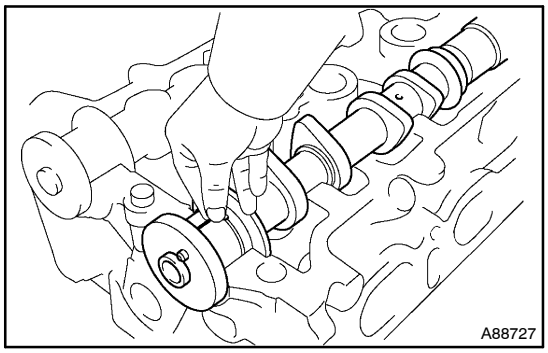
Standard thrust clearance:
0.040 to 0.095 mm (0.0016 to 0.0037 in.)
Maximum thrust clearance: 0.11 mm (0.0043 in.)

If the thrust clearance is greater than maximum, replace the cylinder head. If the thrust of the camshaft is scratched, replace the camshaft, too.

28. INSPECT CAMSHAFT OIL CLEARANCE

(a) Clean the camshaft and bearing cap.

(b) Set the camshaft to the cylinder head.

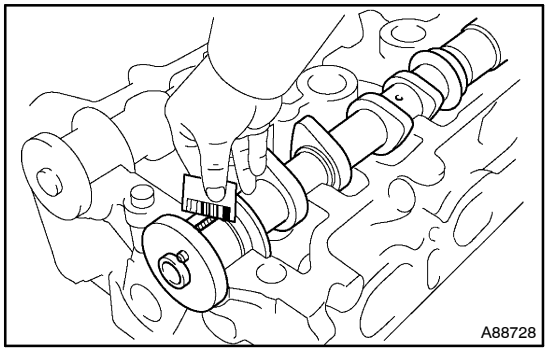


(c) Lay a strip of Plastigage across the camshaft journal.

NOTICE:
Do not turn the camshaft when measuring.

(d) Install the bearing cap (see page 14–98).

(e) Remove the bearing cap (see page 14–98).

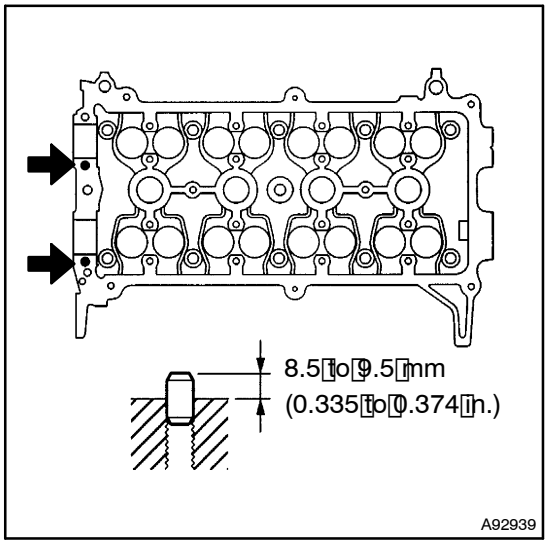


(f) Measure the Plastigage at its widest point.

Standard oil clearance:
0.040 to 0.095 mm (0.0016 to 0.0037 in.)
Maximum oil clearance: 0.115 mm (0.0045 in.)

NOTICE:
Completely remove the Plastigage.

If the width is greater than maximum, replace the cylinder head.



29. INSTALL CAMSHAFT BEARING CAP SETTING RING PIN

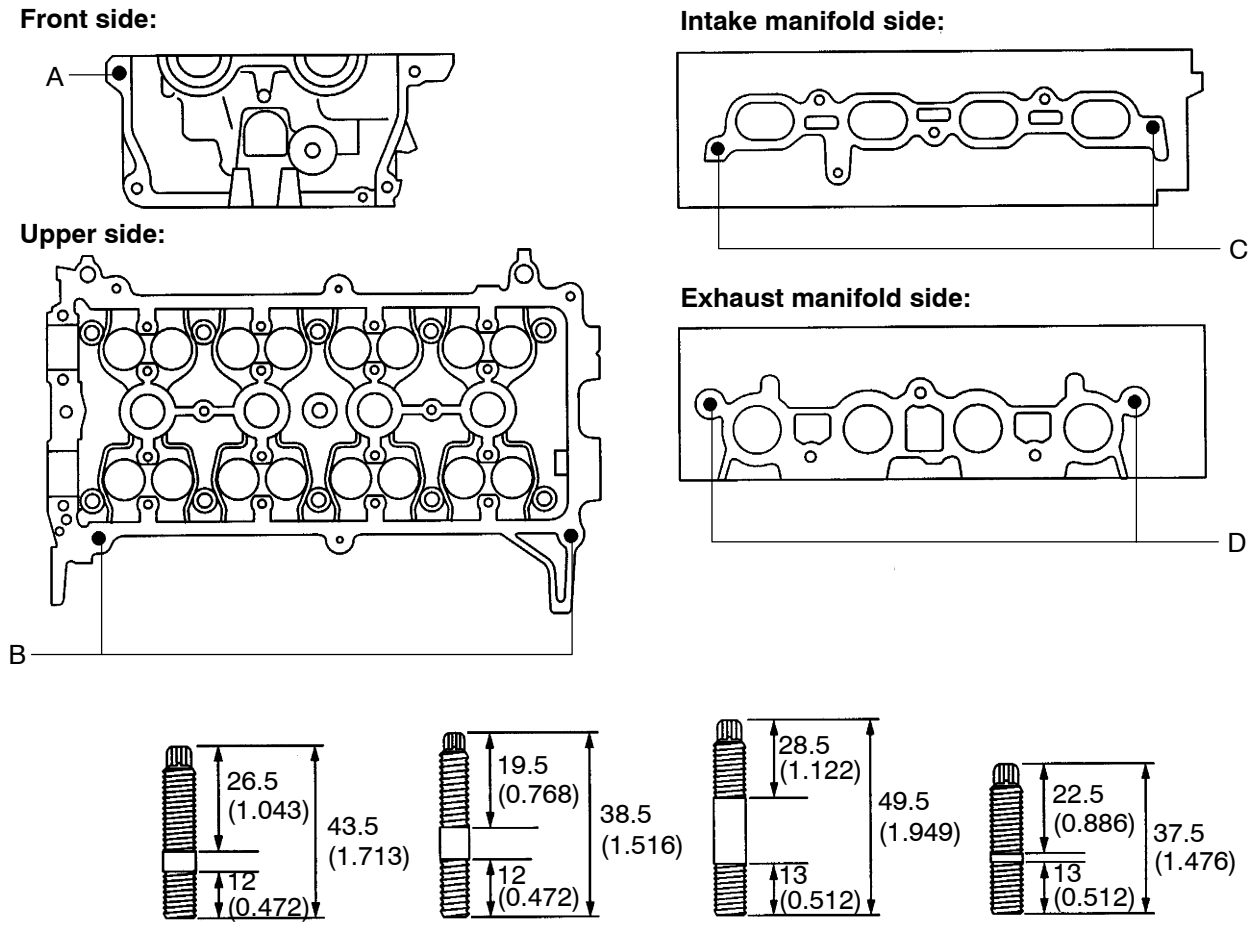
(a) Using a plastic–faced hammer, tap in 2 new ring pins to the specified protrusion height.

Protrusion height: 8.5 to 9.5 mm (0.335 to 0.374 in.)

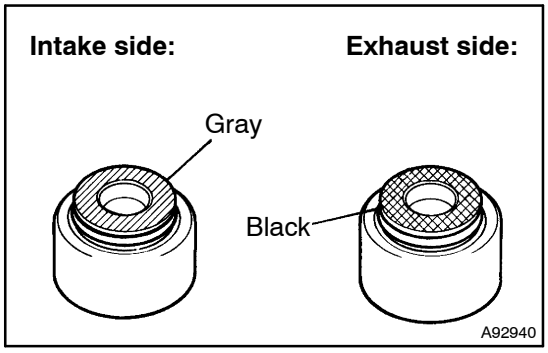
30. INSTALL STUD BOLT

(a) Install the 7 stud bolts in the positions shown in the illustration.

Torque:
10 N·m (102 kgf·cm, 7.4 ft·lbf) for bolt A
4.0 N·m (41 kgf·cm, 35 in.·lbf) for bolt B
10 N·m (102 kgf·cm, 7.4 ft·lbf) for bolt C
9.0 N·m (92 kgf·cm, 80 in.·lbf) for bolt D



31. INSTALL VALVE SPRING SEAT



32. INSTALL VALVE STEM OIL O SEAL OR RING

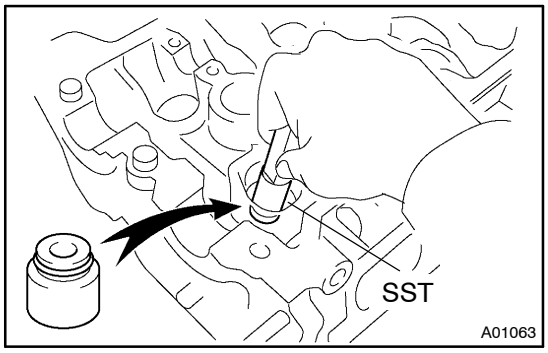
(a) Apply a light coat of engine oil to the rubber lip of a new valve stem oil seal.

NOTICE:

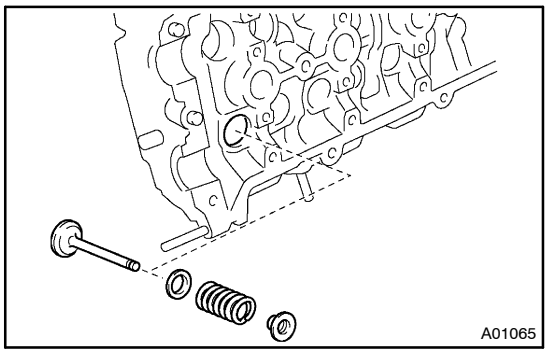
Installing oil seals for intake and exhaust to the opposite valve guide bushes may cause failures.

HINT:

The intake oil seal is gray and the exhaust oil seal is black.



(b) Using SST, install the oil seal.
SST 09201–41020

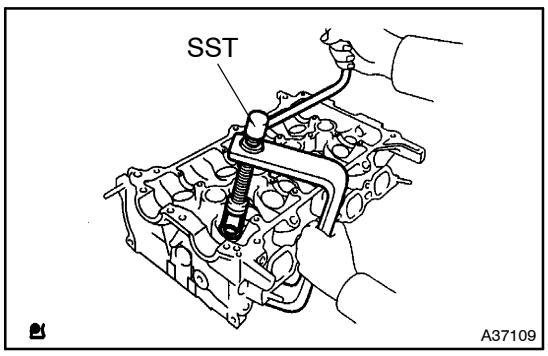


33. INSTALL INTAKE VALVE

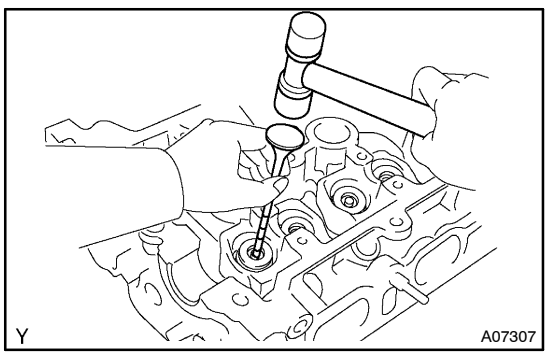
(a) Install the valve, valve spring seat, valve spring and retainer to the cylinder head.

NOTICE:

Install the parts to their original locations.



(b) Using SST, install the retainer lock.
SST 09202–70020 (09202–00010, 09202–01010, 09202–01020)



(c) Using a plastic–faced hemmer and discarded valve with its tip wrapped in tape, lightly tap the installed valve to ensure proper fit.

NOTICE:

Be careful not to damage the tip of the valve stem.

34. INSTALL EXHAUST VALVE

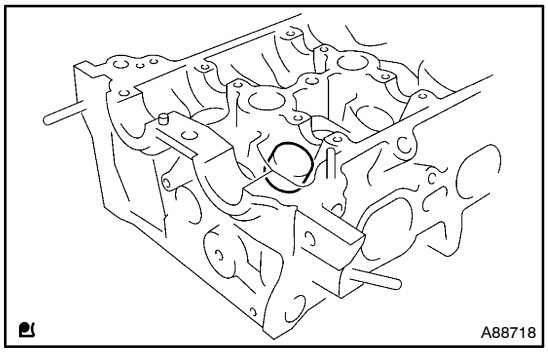
(a) Install the valve, valve spring seat, valve spring and retainer to the cylinder head.

(b) Using SST, install the retainer lock.
SST 09202–70020 (09202–00010, 09202–01010, 09202–01020)

(c) Using a plastic–faced hammer and discarded valve with its tip wrapped in tape, lightly tap the installed valve to ensure proper fit.

NOTICE:

Be careful not to damage the tip of the valve stem.



35. INSTALL VALVE LIFTER

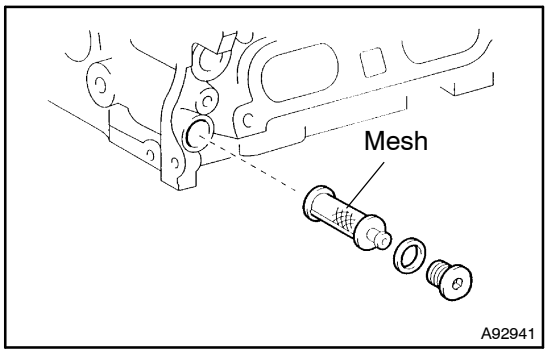
(a) Apply a light coat of engine oil to the valve lifter.

(b) Install the valve lifter to the cylinder head.

NOTICE:

Install the parts to their original locations.

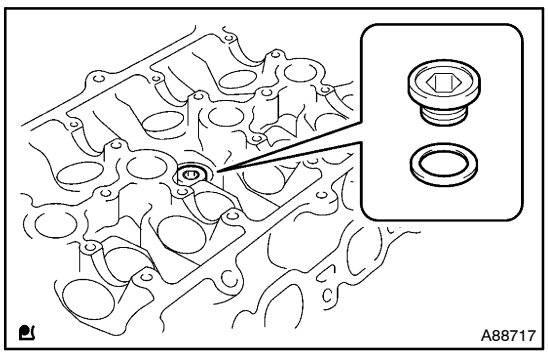
(c) Check that the valve lifter turns smoothly.



36. INSTALL OIL CONTROL VALVE FILTER

(a) Check that there are no foreign objects on the mesh, then install the valve filter to the cylinder head.

(b) Using an 8 mm hexagon wrench, install a new gasket and the taper screw plug with head No. 2.
Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)



37. INSTALL W/HEAD TAPER SCREW PLUG NO.1

(a) Install a new gasket to the plug.

(b) Using a 10 mm socket hexagon wrench, install the taper screw plug with head No. 1.
Torque: 44 N·m (449 kgf·cm, 32 ft·lbf)